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10/500,461

07/14/2004

Ito Tomoyoshi

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10/16/2006

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EXAMINER

CHANG, AUDREY Y

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 10/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/500,461

Applicant(s)

TOMOYOSHI, ITO

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **August 10, 2006** has been entered.
2. This Office Action is in response to applicant's amendment filed on **August 10, 2006**, which has been entered into the file.
3. By this amendment, the applicant has amended claims 1, 4-5, 7, and 9 and has canceled claim 2.
4. Claims 1, and 4-11 remain pending in this application.

Response to Amendment

5. The amendment filed on **August 10, 2006** is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **claim 1 has been amended** to include the phrase “the colors of light being incident on the half mirror spatially offset from each other to produce images of the corresponding colors” and claim 7 has been amended to include the phrase “the light beams are projected to the half mirror spatially shifted from each other and onto the reflective liquid crystal display”. The specification simply fails to disclose that the light beams from the light sources are “spatially shifted or offset” on the half mirror. On the contrary the arrangements shown in Figures 1 and 2 will ensure the light beams from the color light sources to be incident on the half mirror and the reflective liquid crystal display coincidentally with no spatial offset or spatial shift.

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Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. **Claims 1 and 4-11 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejections based on the newly added matters are set forth in the paragraph above.

8. **Claims 1 and 4-11 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification and the claims **fail** to teach how could the colors of light being incident on the half mirror “*spatially offset*” from each other as recited in **claim 1** or “*spatially shifted from each other*” as recited in **claim 7**, when the light beams combiner arrangements ensure the colors of light coincide with each other before incident on the half mirror (HM3).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 4 and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kato et al (PN. 5,852,504) in view of the patents issued to Sekiguchi et al (PN. 5,798,864) and Popovich et al (PN. 6,115,152).

Kato et al teaches a *holographic image display* that is comprised of a *computer* for calculating phase information from three dimensional coordinate data of *objects* (Figures 1-2) to create *computer generated hologram fringe information* wherein the phase information or computer generated holographic fringe information is provided by a *controller* (138, Figure 28) to a *reflective spatial light modulator* (130, **Figure 28**) such as a *liquid crystal display device*, (Figure 26, column 12, lines 7-10) to display the computer generated holographic *fringe* information on the *reflective* liquid crystal display device. Kato et al teaches that a *semiconductor laser light source* (134) is used to illuminating the reflective liquid crystal display via a *half mirror* (142) such that a three dimensional image of the objects, (objects used for calculating the computer generated holographic fringe information) is reconstructed from the reflective liquid crystal display device and is *projected* by the *half mirror* to an observer, (please see Figure 28, columns 11-12). The data of the three dimensional object used for creating the computer generated hologram is externally obtained, (please see Figures 6-7). The controller or the computer is connected to the reflective liquid crystal display, (please see Figure 28).

This reference has met all the limitations of the claims. This reference however does not teach explicitly to use a pinhole filter and a collimator lens disposed between the light source and the half mirror, however this reference does teach that *collimated* light is used to illuminate the liquid crystal display device. Kato et al in a different embodiment teaches that a *pinhole filter* (for creating point light source) and a *collimator lens* (216 or 218, Figure 35) can be used to create *collimated illumination* light beam to illuminate the liquid crystal display device. **Sekiguchi** in the same field of endeavor also teaches

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to use *pinhole filter* and *collimator lens* (202a, Figure 9) between the laser light source and the half mirror for creating *collimated illumination light beam* for illuminating the display device, for displaying a computer generated Fraunhofer diffraction image (which can be one form of computer generated holographic image). It would then have been obvious to one skilled in the art to apply the teachings to modify the holographic image display device of Sato et al to use pinhole filter and collimator lens to *effectively* create the *collimated* illumination beams needed.

Claim 1 has been amended to include the phrase “that the parallel light that illuminate the display is formed from three light-emitting diodes emitting three primary light at the same time and the colors of the light incident on the half mirror spatially offset from each other to produce images of the corresponding colors”. Both **Kato et al** and **Sekiguchi** teach a *full color display* wherein three light sources each generating one primary color of light are being used to illuminate the display via half mirror for the reflective mode of the display, (please see Figure 36 of **Kato et al** and Figure 9 of **Sekiguchi**). However these references teach to use laser light sources but do not teach *explicitly* that the light emitting diodes are used as the light sources. **Kato et al** in fact teaches that the light sources are *semiconductor laser* that emitting red, green or blue light respectively, (please see column 11, lines 40-60), one skilled in the art would understand that a semiconductor laser **is essentially** a light emitting diode light sources for they all based on semiconductor p-n junction for emitting the light. **Popovich et al** in the same field of endeavor teaches that either laser diode (semiconductor laser) or light emitting diodes, (LEDs) may be used to illuminate a reflective holographic display to provide the reconstructed full color holographic image, (please see column 21, line 28 to column 22, line 6). It would then have been obvious to one skilled in the art to apply the teachings of **Popovich et al** to modify the display device of **Kato et al** to use high power LEDs as the light sources for producing the full color images for the benefit of using bright light sources with high output power and narrow bandwidth to improve the image quality.

With regard to amended claims 1 and 7, concerning the color light beams incident on the half mirror spatially offset from each other, the specification **fails** to support for such feature. **Kato** et al and **Sekiguchi** et al teaches that when the colors of light is intended to illuminate the *whole* display surface, the colors of light are not offset from each other. **Popovich** et al teaches when the color light beams are intended to illuminate *different* section of the display surface, the incidences of the light beams are spatially offset from each other. It would then have been obvious to one skilled in the art to apply the teachings of the Popovich et al to modify the incident locations of the light beams when different sections of the display surface are intended to be illuminated by different light beam.

The cited Kato et al, Sekiguchi and Popovich et al reference all teach that the full color reconstructed image is formed by combining the images of the corresponding colors.

With regard to claim 4, Sekiguchi teaches that a field lens is used to project the image, (please see Figure 9).

Claim 9 has been amended to include the feature that the three color light sources are being placed in the specifically claimed arrangement. **Kato** et al teaches that the three color light sources (R, G, B) are being placed at vicinity of each other for providing *a combined* color light via the half mirror. The demonstration in Figure 36, makes the light sources are arranged not in orthogonal directions from each other, however one skilled in the art with the common knowledge would understand they have to be in orthogonal direction arrangement in order for the collimated light from the light sources illuminate the display properly. **Sekiguchi** teaches the three light sources are being arranged off-axis from each other to provide a combined color light to illuminate the display device. Furthermore, one skilled in the art must understand the arrangement for the light source to provide combined color light really poses no patentable distinctions with respect to prior art arrangements, since they do not change the functions of the light sources namely producing the combined color images to the viewer, such modification therefore is considered to be obvious matters of design choice to one skilled in the art.

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With regard to claim 11, it is implicitly true that the size of reconstruction area which is the size of illumination areas of the light sources is determined by the geometric relationship between the pinhole filter, the collimator lens, the display device and the field lens.

11. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Kato et al, Sekiguchi and Popovich et al as applied to claim 1 above, and further in view of the patent issued to Hashimoto (PN. 5,515,183).

The holographic image display device taught by **Kato** et al in combination with the teachings of **Sekiguchi** as described for claim 1 above have met all the limitations of the claims. Both Kato et al and Sekiguchi teaches a holographic display device for displaying *computer generated hologram* that are calculated and created by a computer. It is implicitly true that processing system is included for distributing the holographic fringe information to the liquid crystal display device for display.

Hashimoto in the same field of endeavor further teaches a *real time* holography system wherein *parallel processing units* are used to distribute and therefore display the holographic information on a liquid crystal display, (please see Figure 5). High speed processing is certainly needed for achieving *real time* holography display. It would then have been obvious to one skilled in the art to apply the teachings of **Hashimoto** to include a high speed parallel processing unit for distributing and displaying the holographic information on the liquid crystal display for the benefit of achieving the accuracy and the speed needed for the holographic display.

Response to Arguments

12. Applicant's arguments filed on August 10, 2006 have been fully considered but they are not persuasive.

13. Applicant's arguments are mainly based on the newly amended claims and they have been fully addressed in the paragraphs above.

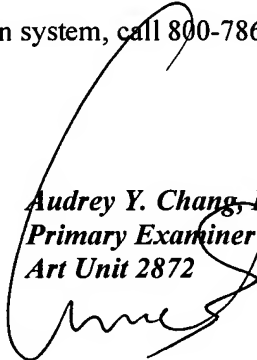
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.